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ABSTRACT

This study focused on the production, dissemination, and assimilation of material published in the major journals on educational research--four "core" journals and three "tangential." Two questionnaires were used: one sent to the authors of all articles published in 1968 and 1969, and the second to the persons whom these authors cited as working in the same field. Analysis of the returns gave the information reported here, covering: (1) the background characteristics of the authors; (2) the average schedule for research work, report writing, article publication, and article citation in other journals; (3) the scope and effect of pre-publication reports; (4) rates of rejection and revision of manuscripts; and (5) the usefulness of the articles to known and unknown co-workers. The author makes several recommendations concerned with making the dissemination process quicker and more effective. (MM)

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SCIENTIFIC COMMUNICATION IN EDUCATIONAL RESEARCH

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Since 1968, AERA has been involved in a program of studies designed to trace, in real time, the dissemination and assimilation of scientific and technical information generated by work begun in 1966 until it could be retrieved from secondary sources such as abstracts or review journals. The first series of studies dealt with scientific information exchange associated with the 1968 Annual Meeting of AERA because the national meeting usually represents the first "public" dissemination of a large portion of work produced. This series consisted of two separate studies. The first study dealt with scientific information exchange at the meeting (Center for Research in Scientific Communication, 1969 a; and Nelson, Garvey, and Lin, 1970) and the second with journal dissemination of the meeting material after the meeting (Center for Research in Scientific Communication, 1969 b; and Nelson, 1970). Two striking trends emerged from these studies. First, the informal network associated with premeeting information dissemination appeared to be poorly structured; as a result, the information consumers showed tremendous lack of awareness of who was currently working on what. Second, the premeeting disorganization of the information system in educational research was only temporarily unified at the meeting, and the postmeeting dissemination again became diffused.

The present study focussed on the production, dissemination and assimilation of material published in the major journals on educational research.

Method

Selection of journals for the present study proceeded in the following way: The journals published by AERA formed the basis for a citation analysis. References in issues published during 1965 and 1966 were examined, adding to the sample journals often cited therein, and adding their references in turn. This process continued until a point of diminishing returns had been reached, i.e., until the remaining journals no longer appeared in the mainstream of literature on educational research.

Such analyses, conducted for various disciplines including educational research have indicated that, a small number of journals form the core of the journal literature; a larger number of journals form the periphery of this journal literature; and, a very large group of journals were loosely associated with the first two groups.

On the basis of the analysis for educational research, all of the "core" and the most relevant of the "tangential" journals were selected for study. These journals are shown in Slide 1.

Beginning with the first issue published in 1968 and continuing throughout the next two years, as soon as possible after the publication of each issue of a "core" journal, each first author of an article in that issue received a questionnaire pertaining to the content of his article. (If someone was the first author of more than one article, only the earliest such article was used.) For tangential journals only those articles were selected in which either three or 30% of the citations were to articles published in core journals. A total of 385 authors returned usable questionnaires for a response rate of 90%.

This study was designed to trace the prepublication dissemination of the main content of the article, from the beginning of the work by the author to the time of publication. Prepublication dissemination may include "preliminary" reports (reports of preliminary findings of work not yet completed), and later reports of completed work. The study also sought to determine the extent to which authors of articles on educational research participated directly in these report media and the effect of their participation on their own work as it was modified and revised before submission for publication.

The following topics will be discussed in the first part of the paper:

1. The background characteristics of the authors
2. The prepublication schedule of the work published
3. The scope and effect of prepublication reports
4. The submission of manuscripts to journals
5. The continuity of work in educational research; i.e., the extent to which authors were involved in new work related to their articles at the time of tis publication, and
6. The availibility of information contained in the journal articles from secondary sources.

The second study to be described dealt with the group of persons whom the authors of the articles in the journal study cited as conducting work in the same subject-matter areas as those of their articles (work which was derived from their findings, stemmed from the same conceptual or theoretical framework, attacked the same problem from a different point

of view, stimulated their work, etc.). These persons received questionnaires pertaining to the articles of the authors who had cited them. The questionnaires were designed to determine the following:

1. The extent to which respondents were familiar, before publication of the journal articles, with the work described in the articles
2. The extent to which respondents has assimilated useful information from authors' prepublication dissemination of the main content of their articles
3. The extent to which resondents were aware that the articles had been published
4. The extent to which respondents had examined the articles, and
5. The extent to which respondents acquired useful information from the published articles.

Since the informal network associate with prepublication information exchange was of particular interest each person named by an author was also asked to name one or two persons working in the same area as the published article. These persons, in turn, if they were not included as authors or persons named by authors were sent the same questionnaire sent to persons named by the authors. This process was repeated once more, but by this time few new persons were being added to the sample. A total of 159 respondents returned usable questionnaires for a response rate of 62%.

Results

Information--Dissemination process associated with the production of journal articles on educational research

Characteristics of the Authors

Most of the authors held doctorates (89%), and those without doctorates (79%) were studying for advanced degrees. The median date of the authors reception of their highest degree was 1964 or four to five years before publication of their articles. (Considering estimates that the number of scientists doubles every 12-15 years, we might well have expected half the authors to have received their highest degree in the past 12-15 years.) We can therefore assume that journal articles authors were a relatively young group of researchers.

The authors named 98 different universities which had conferred their highest degrees. However, over half (54%) of the authors had received their highest degrees from only 16 universities, and over a third (36%) from only nine institutions. Each author was asked to name the area within his discipline in which he had received his highest degree. Over two-fifths of the respondents indicated psychology (other than educational psychology) as their area, while 27% indicated education (other than educational psychology) and 22% indicated educational psychology. As can be seen by Slide 2, this distribution was markedly different from the distribution obtained from the authors of presentations at the 1968 AERA Annual Meeting. The difference in distribtuions can be understood if the distribution for the various journals studied are examined. AERJ tended to publish more work by persons who received

their degrees in educational psychology than the other journals, while the Journal of Educational Psychology and Educational and Psychological Measurement published more work by those who received their degree in psychology, and Journal of Educational Research by those who received their degree in education.

Most of the authors (82%) were working in academic institutions and these 315 authors were working in 150 different institutions. Twenty-eight percent of these authors were the only persons at their institutions producing articles in the studied journals in 1968 and 1969.

Authors were asked to rank various professional activities in terms of the amount of time they devoted to each. Most authors participated to some extent in teaching (82%), applied research (74%), research guidance (71%), consulting (63%), basic research (62%) and administration (51%). Teaching was indicated as the most time consuming activity by 41% of the authors, basic research by 15%, administration by 15%, and applied research by 11%.

Nature of Work in Articles

Almost half (48%) of the authors characterized the work reported in their articles as single field studies, while 20% characterized the work as a single experimental study and 11% as theoretical treatises. Only 3% of the articles reported a series of studies and 6% were methodological or statistical studies. The remaining studies were various combinations of the above types of reports.

Descriptions of Dissemination Process

Slide 3 diagrams the process of the dissemination of scientific information from the time a scientist begins his work until the time it appears in secondary sources. The following discussion describes this process for the typical author, and takes as its reference point the date of journal publication, relating all events both before and after publication, to this date.

Work published in the journals studied began 33 months on the average before publication and 11% of the work was initiated five or more years before its publication. Preliminary reports (i.e., reports of the work before its completion) were made by 18% of the authors. The reports were typically made to very small audiences. For example, 70% of all preliminary reports were given as colloquia, briefings, thesis committee reports, written theses or in-house reports. Additionally, only 19% of all reports presented before the article's publication were preliminary reports. Thus, there was little dissemination of the work before its completion. The average preliminary report was made five months before the work had been completed.

Genuine dissemination began when the authors completed their work--20 months before publication. Fifty-eight percent of the authors made some report of their work between the time it was complete and published. Slide 4 shows the percentage of authors making prepublication or preliminary reports as well as the kinds of reports made. The most frequent presented types of oral reports were colloquia within the author's own institution (14%), national meeting presentations (13%), and thesis

committee meetings (12%). The two types of written reports which were made by at least a tenth of the authors were: dissertations or theses (23%) and technical reports (16%). Almost half (43%) of all reports took place within two months after the author had completed his work. Since 79% of all reports were presented before manuscript submission, once a manuscript had been submitted to a journal for publication, the information contained in it became effectively obscured from the scientific community.

As just mentioned, the thesis or dissertation represented a major prepublication medium for journal articles. However, information based on theses or dissertations moved slowly through the prepublication process since the typical written thesis was complete 25 months before its publication. Moreover, the time between the time work reached a report stage and its submission to a journal was four months greater for those who made prior reports compared to those that did not.

The dissemination of work before it was submitted to a journal enabled authors to disseminate research well before its publication and to receive feedback which allowed them to modify manuscripts before submitting them to journals. As can be seen by Slide 4, forty-five percent of those authors who reported contents of their articles before publication reported they had modified their manuscripts becuase of the feedback received from such prepublication reports. Somewhat more of the authors who made oral reports (39%) than had made written reports (29%) reported such modifications. With regard to oral reports, the more informal the presentation the more likely the author was to receive feedback which led to some modifications. Thus 55% of those who presented

their findings at thesis committees modified their work as a result of such a presentation, 41% of those who gave colloquia within their own institution did so, while only 26% of those who made presentations at national meetings did so. These modifications may be classified into two types: changes in style or general form (accounting for 40% of the modifications) and changes in content, e.g., clarification or redefinition of concepts, incorporation of others findings, more detailed description of results, new emphasis or change in interpretation, etc. (accounting for 60% of the modifications).

On the average the authors began writing their manuscripts one month after the work had been completed.

The distribution of preprints (i.e., prepublication copies of the manuscript) represented another form of prepublication dissemination. Forty-two percent of the authors distributed preprints, and on the following occasions: 24% distributed them before submission of the manuscript; 13% after submission but before acceptance of the manuscript, and 15% after acceptance, some authors distributing them on more than one occasion. The median number of preprints distributed at the various stages were two, five and five, respectively.

Authors distributed preprints mainly to two groups: to colleagues working in the same area (mentioned by 72% of those distributing preprints) and to people with some prior knowledge of the work, and who had requested preprints (mentioned by 49% of these authors). Since 49% of the authors sending preprints, sent them to people who had requested them, these requests indicated that some people had been effectively informed of the work through informal communication. Only 14% of the authors who distributed preprints did so as a routine matter to fellow members of a preprint-exchange group.

Those authors who had distributed preprints before submitting their manuscripts to a journal had an opportunity to receive feedback leading to modifications of their manuscripts. Of those authors who sent preprints before submission, 56% modified their manuscripts because of feedback from preprint distribution. Of those authors so modifying their manuscripts, 53% made stylistic changes only, 25% made content changes only, and 22% made both types of changes.

In our tracing of the development of material published in journals on educational research, we have reached the stage at which authors were ready to submit their manuscripts to journals for publication. By the time a manuscript was submitted, the research had been completed for seven months; almost all prepublication reports had been made; and modifications due to consequent information feedback had been made.

As to the criteria authors used to select the journal in which to publish their work, most (82%) of the authors indicated that "the audience reached by the journal" had constituted a major criterion. The editorial policy of the journal was mentioned by 26% of the authors as a criterion.

Not all of the authors had their manuscripts published in the first journal to which they submitted them. Eighty-nine (23%) of the authors had either withdrawn their manuscripts from, or had received editorial rejection by, another journal. For 18% of the prior submissions, the authors withdrew their manuscripts, typically because the suggested revisions were inappropriate (mentioned by 15% of the authors). (However, most of the authors, 82%, of nonaccepted manuscripts had received

editorial rejection of their manuscripts owing mainly (44%) to the inappropriateness of the subject matter for the rejecting journals. Other reasons often given for rejection were: theoretical or interpretational problems (17%) and manuscript length (15%).)

These 89 manuscripts were withdrawn or rejected by 43 different journals. At least four of the manuscripts were previously submitted to the following journals: Journal of Educational Psychology (13 manuscripts); American Educational Research Journal (7); Journal of Personality and Social Psychology (6); Psychological Bulletin (5): and Journal of Experimental Social Psychology and Personnel and Guidance Journal (4 each). Journal of Educational Research appeared to be the recepient of manuscripts rejected by the Journal of Educational Psychology and American Educational Research Journal in that it published nine of the 13 manuscripts previously submitted to the Journal of Educational Psychology and five of the seven submitted to American Educational Research Journal. The non-acceptance of a manuscript by one journal added five months to the overall publication lage. Slightly less than half (44%) of the authors experiencing non-acceptance of their manuscripts revised them before resubmitteding them to journals in which they were eventually published.

The presentation of or the modification as a result of a prior report had no effect on the extent to which authors experienced non-acceptance of their manuscripts. Non acceptance was experienced by 23% of the authors amking no prior reports, 24% of those making prior reports and not modifying their work as a result of them, and 23% of those making prior reports and modifying their manuscripts as a result of them.

Authors' Continuation of Work in the Same Area as that Treated in Their Articles

Since the production of scientific information is a cyclical process (researchers tend to continue work in the same area as that treated in the articles at the time of their publication), authors were asked questions about work they had done on the same subject since the completion of their articles. By the time of publication most authors (64%) were involved in new work in the same subject-matter area as that treated in their articles, and 73% of this new work evolved directly from the work reported in the published articles. The work of those authors conducting new work had progressed well--by the time articles were published 55% of the new work had been completed. Of the authors whose work had reached the report stage, 40% had reported their new work before the publication of their article, 62% of these authors had made oral reports, and 67% had made written reports.

At the time of publication, 97% of those authors who had initiated new work in the same area reported definite plans for publication of their new work. A journal was the medium most often mentioned for the planned dissemination of this new work (mentioned by 75% of these authors). In addition, books were mentioned by 11% of these authors and technical reports by 9%. The median date when these authors planned to submit manuscripts based on this new work to journals was eight months after the publication of their first articles.

All authors were sent follow-up questionnaires on the average 26 months after their article had been published. The response rate based on 260 returned questionnaires was 68%. Of these authors, 57% had

conducted work in the same subject-matter area as their original article and 44% of those working in the same area had published at least one article after their original article had been published. Thus only 25% of the authors had published a subsequent article in the same area as their original article.

Citation of the Articles in Secondary Sources

We were also interested in the dissemination process after the articles were published. Three types of secondary sources were examined: abstract journals, references in the "core" journals studied and articles in the Review of Educational Research. The extent to which these secondary sources covered the field of educational research and the time lags between their appearance and the publication of the cited articles were examined. Each of these secondary sources serves a different function in intergrating the literature on educational research: (1) the abstract places the article in a public secondary source along with other contemporary works on the same subject; (2) citations by other articles relate the article to the cumulative knowledge on the subject; and (3) reviews synthesize and evaluate "recent" progress in an area.

At the time of the study no abstract journal covered all four "core"journals. For example, Psychological Abstracts covered the Journal of Educational Psychology and Educational and Psychological Measurement, but not American Educational Research Journal or Journal of Educational Research. Since that time, however, ERIC has started publishing Current Index to Journals in Education but this publication does not publish

abstracts for all the articles cited. Thus there is still no abstract journal for the field of educational research.

Another stage in the dissemination processes occurs when the work described in the published journal article is integrated into a published review. In order to obtain an estimate of when this process occurs on the time scale for the information flow in educational research, all journal references in articles published in the 1970 issues of Review of Educational Research were tabulated. These articles cited a total of 1171 journal references.

The following percentages of the total journal references which were citations to articles published by each of the "core" journals gives some indication of the extent to which each of the journals was cited in these reviews:

Journal of Educational Psychology	9.3%
American Educational Research Journal	3.8%
Educational and Psychological Measurement	3.6%
Journal of Educational Research	2.1%

Thus only 23% of the journal reference were to the articles published in the journals studied. Also the average time between publication of the article in one of the "core" journals and its citation in a review was 49 months, and 23% of these citations were to articles at least ten years old.

In their articles, authors usually cited previous work, when relevant in order to place their current work in proper perspective. Examination of recent issues of the "core"journals (i.e., issues published

after those included in this study) revealed that insufficient time had elapsed since the studyied articles were published to allow for their citation in other articles. Accordingly, to estimate the time lag in this process, we examined every issue in 1970 of each of the "core"journals and tabulated the publication dates of the cited articles published in the studied journals. This procedure revealed 389 citations to articles published previously in these journals.

As can be seen in Slide 5, the Journal of Educational Psychology was the most frequently cited journal (48% of all references citing its articles). Educational and Psychological Measurement accounted for 28% of the citations, while the Journal of Educational Research and American Educational Research Journal accounted for 13% and 12%, respectively. No doubt the reason so few of the citations were to AERJ was that it started in 1963.

As can be seen in Slide 6, the typical citation of an article published by the journals studied occurred 61 months after the articles' publication, i.e., 50% of the citations were to articles published no less than 61 months earlier. The average age of a citation to AERJ was 32 months, again reflecting the fact that the journal was much newer. Turning to the age of citations in each of the journals studied, AERJ and the Journal of Educational Psychology tended to cite more recent work. This finding would indicate that these two journals publish more material in the "hotter" areas of educational research.

Examination of Informal Communication in Educational Research

Research for the average journal article on educational research was completed 20 months before publication. Most authors reported their work before publication. Prepublication dissemination enabled the information consumer to acquire useful information well before its journal publication. This section of the paper discusses the effect of prepublication dissemination of information (eventually contained in the articles studied) on other workers in the same areas as those treated in the articles.

Characteristics of Respondents

Presented in Slide 7 are the characteristics of the article authors and the other workers in the field (named by the authors of other workers in the field). The characteristics of the two groups were quite similiar except that the other workers were more experienced in the field (the typical other worker had received his highest degree six years before the typical author). Additionally, more of the other workers compared to the authors indicated basic research and fewer teaching as their primary professional activity and more indicated some activity in administration and research guidance.

Involvement in the Same Area as that Reported in the Articles

Most of the other workers (58%) had conducted work in the same subject-matter area as that described in the critical article within a year prior to the publication of the article. The other workers had actively disseminated the results of their work in the area of their critical articles. Fifty-five percent had published at least one journal

article and 56% had presented work in the same area at a national meeting. The median number of such articles published by those that did publish their work in journals was three and the median date when the first article appeared was 54 months before the publication of the critical article, while the latest such article was published one month before the publication of the critical article. The 67 other workers who named the journal which published their latest article, indicated that they had appeared in 45 different journals. The Journal of Educational Psychology and the Journal of Verbal Learning and Verbal Behavior were the most frequently mentioned outlets for the work, each publishing five such articles. The latest national meeting presentation was made on the average seven months before the critical article was published. The two most frequently mentioned meetings where these presentations were made were at an AERA meeting (mentioned by 36% of those making such presentations) and an American Psychological Association meeting (mentioned by 27%).

Respondents' Contact with Information in the Published Journal Articles

This section of the paper deals with the nature and extent of other workers contact with the information reported in the critical articles. First communication activities which occurred before publication of the critical articles will be considered and the post-publication communication activities. Slide 8 diagrams the relevant events.

Most of the other workers (71%) were acquainted with the previous work of the article authors; work conducted by authors before that reported in the critical articles. Moreover, 50% of the other workers had cited the authors previous work in their own work.

Turning to the communication between authors and other workers, 50% of the other workers reported that they maintained contact with the authors on a continuing basis to exchange scientific or technical information. In addition, 55% of the other workers were acquainted with the specific work described in the critical articles before publication. On the average these other workers were acquainted with this work 20 months before it was published or at the time of its completion. Knowledge of the work prior to its publication was typically obtained through informal channels. For example, 35% of the total sample of other workers learned of the material through face-to-face discussion with the author and 12% each learned of it through correspondence with the author or a preprint. However, only 6% of the other workers learned of the material from a national meeting presentation and 4% from a technical report. Finally 45% of all the other workers acquired information which they felt would be useful in their current or future work from prepublication sources.

Other ways of looking at assimilation of information contained in the article before its publication is to examine the data from only those other workers who were acquainted with the material before its publication. Sixty-two percent of thes other workers learned of the material through face-to-face discussion with the author, 22% of them

obtained it through correspondence with the author and 22% from a preprint. Only 11% learned of it from a national meeting and 8% from a technical report.

This information of the content of the articles obtained before its publication had a tremendous impact on those other workers who were acquainted with it. Eighty-one percent of these other workers acquired information from prepublication sources which they found useful in their current or future work. This information proved useful in a variety of ways. The most frequently mentioned ways in which the information proved useful were: reinterpretation of data (mentioned by 27% of those who found the information useful); incorporation of a new technique (mentioned by 22%); revision of procedures and as a background (each mentioned by 18%), and specific results (mentioned by 15%). The three parts of the papers which proved most useful were: methodology (mentioned by 52% of those finding the information useful); results (mentioned by 44%) and theory (mentioned by 27%).

Turning to the other workers postpublication contact with the critical articles, 61% of the other workers were aware that the article had been published. Another 31% had not seen the issue in which it was published and 8% were unaware of its publication but had seen the issue in which it appeared. Over half (53%) of all the other workers or 88% of those who were aware of its publication had examined it. Thirty-six percent of all other workers or 68% of those who examined the article read it in its entirety. Another 13% of all other workers or 25% of those who examined it, had merely scanned the article. The remaining respondents had read only a portion of the article.

Compared with the usefulness of the information obtained from prepublication sources, the information in the journal article proved less useful to the other workers. Only 12% of the other workers or 22% who examined the journal article obtained useful information from it while 45% of all other workers or 81% of those with prior acquaintence had obtained useful information from prepublication sources. The ways in which the information proved useful and the sections of the journal articles which proved most useful were quite similiar to the findings from prepublication sources.

Comparison of other workers acquainted with the work described in the articles before their publication with the other workers having no such acquanitance.

More than two-fifths of the other workers indicated that they had no acquaintance with the specific work reported in the journal articles before their publication. In this section the background characteristics and scientific information-exchange behavior of this group (No-Prior-Contact group) will be compared with those respondents who were acquainted with the content of the article before its publication (Prior-Contact group).

By and large, there were few differences in the background characteristics of the two groups. However, compared to the Prior-Contact group, the No-Prior-Contact group had on the average received their highest degree three years earlier and fewer of them had received their degrees in educational psychology (17% compared to 27% of the Prior-Contact group). Moreover, more of the Prior-Contact group indicated some involvement

in administration (75% compared to 56% for the No-Prior-Contact group) and design or development work (49% compared to 34% of the No-Prior-Contact group).

The two groups differed in the extent to which they were active, in the last year, in the same subject-matter areas as those of the articles, the Prior-Contact group was more active (70% of them compared to 42% of the No-Prior-Contact group indicated such activity). Both groups were active in disseminating the results of their work in the same subject-matter area. Fifty-eight percent of the Prior-Contact group and 52% of the No-Prior-Contact group had published an article in the area and 58% of the former group and 53 % of the latter group had made a national meeting presentation in the area. There was evidence that the No-Prior-Contact group identified more with psycholgy than educational research. For example, while only 17% of the respondents in the Prior-Contact group who had made a national meeting presentation had made their latest presentation at an American Psychological Association meeting, 39% of the No-Prior-Contact group had done so. On the other hand, 41% of the Prior-Contact group had made their latest presentation at an AERA meeting while only 31% of the No-Prior-Contact group had done so.

More of the Prior-Contact group reported awareness of the author earlier work than did the No-Prior-Contact group. Ninety percent of the Prior-Contact group compared to 48% of the No-Prior-Contact group reported such acquaintance. Furthermore, among those respondents in each group familiar with the authors previous work, the Prior-Contact

group had more frequently cited the author's previous work in their own reports (75% of these Prior-Contact respondents compared to 59% of those No-Prior-Contact respondents) and had more often maintaned continuing contact with the authors to exchange scientific or technical information (81% among the respondents in the Prior-Contact group compared to 47% of those in the No-Prior-Contact group).

Seventy-eight percent of the Prior-Contact group and only 39% of the No-Prior-Contact group at the time of the survey knew that the article had been published. Moreover, 15% of the Prior-Contact group and 44% of the No-Prior-Contact group had not seen the issue of the journal in which the article was published.

Sixty-five percent of the Prior-Contact group and 39% of the No-Prior-Contact group had examined the article. Thus all of the respondents in the No-Prior-Contact group who were aware of the article examined it while 83% of those Prior-Contact respondents had done so. The Prior-Contact group had examined the article more thoroughly (72% of the respondents in the Prior-Contact group who had examined the article read all of it, while 61% of those respondents in the No-Prior-Contact group had done so).

The published article was of little use to those respondents who were familiar with the work before its publication. Only 2% of the Prior-Contact group had gained useful information from the published article. Since 47% of this group had read the entire article, the information in the published article seemed redundant and served for the Prior-Contact group essentially as a check, after the manuscript had gone through the reviewing process. That is, they wanted to see

if anything new or different had been added to the content of the article since they had encountered information about it earlier in the informal domain.

The situation for the No-Prior-Contact group appeared totally different. Twenty-four percent of these respondents acquired useful information from the article. This figure seemed especially impressive because only 39% of this group were aware that the article had been published. Thus, 61% of the No-Prior-Contact group who examined the article found useful information in it.

Thus, the published article served mainly those persons who were not part of the informal network through which the published articles had been disseminated well before publication. Moreover, the ways in which the information obtained from the articles and prepublication sources proved useful were similiar. Therefore, while prepublication sources serve similiar information fuctions as do the articles for workers active in the area, they do so much earlier in the dissemination process.

Discussion and Summary

The process of the dissemination of scientific information for the same time a scientist begins his work until the time it appears in secondary sources is shown in Slide 3. The following discussion describes this process for a typical author, and takes as its reference point the date of journal publication, relating all events, both before and after publication, to the date.

Work published in the journals studied began 33 months on the a average before publication. About five months before the work was completed, about a sixth of the authors presented preliminary reports of their work. These reports did not constitute significant dissemination since they were usually presented to small audiences. The work was completed on the average 20 months before its publication and authors started writting their manuscripts one month later. This was also the period when most of the prepublication dissemination took place. Fifty-eight percent of the authors reported their work between the time it was completed and published and these reports occurred on the average two months after the work was completed. This prepublication dissemination should have served both the author and the consumer, however, it seemed mainly to be serving the author. Forty-five percent of the author presenting a prior report modified their manuscript as a result of feedback received from presentations. On the other hand, only 10% of the other workers learned of the work by means of an author's prepublication report.

Distribution of preprints before submission provided one last opportunity for the author to receive comments on his work before involving it in the journal editorial process. One-fourth distributed preprints at this time and 56% of those who did received feedback which led them to modify their manuscripts.

At this point manuscript submission occurred. The average time between submission and publication was 13 months. However, 23% of the article studied had been submitted to journals other than those which eventually published them. Such rejections added five months, on the average, to the publication lag.

Their manuscripts submitted, few authors continued to make prepublication reports. However, preprint distribution continued, 13% of the authors distributed preprints during the period between submission of the manuscript and its acceptance and 15% did so between its acceptance and publication. While the distribution of preprints before submission appeared to be an attempt on the part of the authors to obtain useful information feedback, distribution after submission seemed to serve as an early publication medium.

Preprint distribution apparently represented the consumer's last opportunity to gain access to the information before its publication. The finding that 49% of the authors who distributed preprints did so to person who had requested a copy of the manuscript attests to the extent of the consuming desire to gain early access to the information.

During the period between the submission of manuscripts and publication, authors were typically conducting new work in the same

subject-matter area treated in their articles. This new work was initiated, on the average, at the time the previous manuscript was submitted and 56% of the new work had been completed by the time the original work had been published. In fact, a fourth of the new work had been reported seven months on the average before the previous work was published.

It is no surprising fact then, that little dissemination takes place between the time an author submitted his manuscript and its publication, for he was involved in his new work. In fact, by the time the original article was published, the information contained in it was, to a certain extent, obsolete, since 1) further work in the subject-matter area as that in the article has been conducted by the author, and 2) most authors planned to submit this new work to journals within eight months after publication of the article.

In most disciplines the first dissemination after journal publication is the publication of abstracts of articles in an abstract journal. However, for educational rese rch no such journal exists.

Next in the information flow in educational research, the author of a review article in Reivew of Educational Research synthesizes the works of many authors and integrates the information contained in these works into the current body of scientific knowledge. An article cited in such a review was published on the average 49 months before the review article's publication.

The final event, in the information flow process, was the citation of the article by other authors in their published work. Other

authors cite, in their published articles, work which had been published on the average, 61 months earlier.

The information flow process from initiation of a piece of research until its integration into the archival body of scientific knowledge is extremely long and slow. Only a little flows through "public"media compared with media which reach only a limited audience, and this stage generally comes late in the dissemination process. The active researcher connot wait for the work to be published for if he did so, he would be obtaining "obsolete" information. Moreover, in educational research because of the multitude of journals which publish such material and the lack of an abstract journal, it is quite likely that the researcher is unaware of an article's publication. For example, 39% of the other workers were unaware of the article's publication and 89% of the persons who requested a copy of an AERA meeting presentation, which was later published, were unaware of it's publication.

From this and our earlier studies it is quite evident that both the formal and informal communication systems in educational research are extremely diffuse it is therefore, extremely difficult for the researcher to obtain the information he needs. Three probable causes of this situation are 1) the field is interdisciplinary, 2) it has grown rapidly in the recent past, and 3) there are numerous professional organizations in the area.

An examination of the lags in the overall information-flow process reveals a number of critical points which not only confirm the need for imporvement of the process, but also the loci where such improvements are necessary.

The period between submission and publication of manuscripts is not only extremely long (it constitutes 39% of the time between initiation of work and publication), but it is also critical since most authors cease to report the work once it has been submitted. This critical period seems in need of innovations which would help to make information potentially available in the informal domain more accessible to the scientific community. First, the publication lag is much too long--the maximum such a lag should be 8 to 10 months. There are two methods of decreasing publication lag--increasing rejections and expanding the journal. For educational research the latter seems preferable since rejection rates are already high and each journal studied publishes relatively few manuscripts in any year. Second, a list of manuscripts accepted by a journal should be published in the journal before these articles appear. Such a listing would allow interested persons to obtain the information four to eight months sooner and would also be helpful in alerting scientists to work being published soon.

As was mentioned previously there are a multitude of journals publishing material on educational research and most of these journals publish few articles in any year. It would seem to be of great benefit to the consumer if a number of these journals could be combined into a small number of much larger journals. The Office of Education would be an appropriate agency to work with the various professional societies to encourage this type of enterprise. Another method by which the Office of Education can help in expanding the journals is to provide money directly to the professional associations or indirectly through encouraging grantees

to use a portion of their money to pay for page charges. Page charges allow a journal to publish as many articles as it wishes without worrying about page allotments. This latter system is typical in the physical sciences. For example, the Journal of Geophysics has page charges of $45 a page to be paid only if the author's institution or grant will pay for it. If not, no charges are levied.

The study of the usefulness of information published in journal articles was directed at a special class of information users -- workers active on the research front associated with the specific subject matter of the articles. The results of the study clearly show that most such workers had gained useful information, later contained in journal articles, before the work was published. Those workers who found information in the published article useful were those who had no earlier contact with the information. These results raise some questions concerning the function of current journal articles: Can the journal article any longer be regarded as a vehicle which effectively convey current scientific information? If not, can the journal article be reworked to function in the capacity of integrating scientific information into a larger framework.

Another major problem associated with the process of scientific communication in educational research involves the lack of integration of new work into the present body of literature. Given the numerous number of journals which publish material relevant to educational research, a comprehensive abstract journal is a necessity; publishing just titles and authors is not enough. Current Index to Journals in Education seems to be the publication to provide this service, but it must publish abstracts of all articles it indexes.

The recent changes in the Review of Educational Research need to be carefully evaluated to make sure it is providing the necessary review articles to the field. This is especially true since review articles recently have taken on increasing importance due to the exponential growth in scientific information.

In conclusion, the major problems associated with scientific communication in educational research seem to originate in the system. That is, it is not the behavior of the educational researcher which is causing the problems: it is rather features of the system over which he has little control. Clearly it is the professional society, whose major function is fostering scientific communication, and the Office of Education, whose function is improving education, which must work together to eliminate these problems.

References

Johns Hopkins University Center for Research in Scientific Communication. A study of scientific information exchange at the 1968 American Educational Research Association meeting. Report No. 9, 1969 (a), Johns Hopkins University, Baltimore, Maryland.

Johns Hopkins University Center for Research in Scientific Communication. The post meeting dissemination in scholarly journals of material presented at the 1968 annual meeting of the American Educational Research Association. Technical Note No. 8, 1969 (b), Johns Hopkins University, Baltimore, Maryland.

Nelson, C. E., Garvey, W. D., & Lin, N. Scientific information exchange surrounding the 1968 annual meeting of the American Educational Research Association. American Educational Research Journal, 1970, 7, 169-188.

Nelson, C. E. The post meeting journal dissemination of material presented at the 1968 American Educational Research Association annual meeting. Paper presented at the meeting of the American Educational Research Association, Minneapolis, March, 1970.

Journals Studied in Current Program

American Educational Research Journal - Core

Educational and Psychological Measurement - Core

Journal of Educational Psychology - Core

Journal of Educational Research - Core

Child Development - Tangential

Journal of Personality and Social Psychology - Tangential

Personnel and Guidance Journal - Tangential

Slide 1

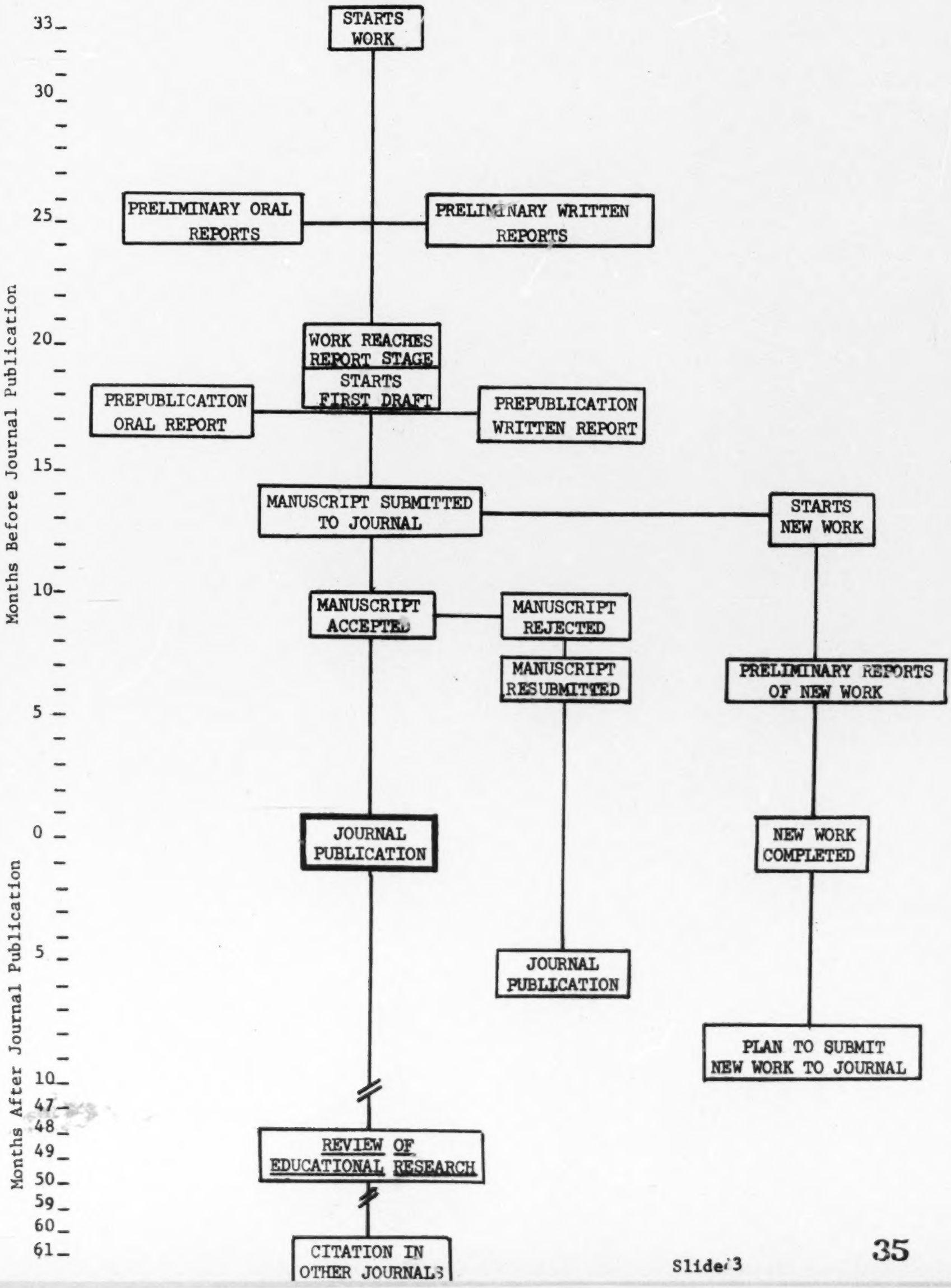
Respondents Area of Specialization for Their Highest Degree

1968

	Journal Authors (N=385)	AERA Meeting Authors (N=256)	AERJ (N=47)	Journal of Ed. Psych. (N=72)	Journal of Ed. Res. (N=135)	Ed. & Psych. Meas. (N=109)
Educational Psychology	21.8%	34.8%	40.4%	29.2%	16.3%	14.7%
Education (other than Educational Psychology)	27.0	47.6	31.9	8.3	52.6	9.2
Psychology (other than Educational Psychology)	43.6	16.8	23.4	58.3	23.7	67.9

Slide 2

Schematic Diagram of Information Flow in Psychology



Preliminary and Prepublication Reports and Modifications Resulting from Such Reports

Nature of Report	Percentage Making Report (N=385)	Percentage Modifying [a]	
Any Report	70.4%	33.0%	(127)
Oral Report	48.6	39.0	(187)
Colloquium within own institution	13.6	41.5	(53)
Colloquium outside own institution	3.7	26.7	(15)
Local, State or Regional Meeting	7.4	24.1	(29)
National Meeting	12.8	26.0	(50)
Internatioanl Meeting	1.2	40.0	(5)
Scientific or Technical Committee	0.5	0.0	(2)
Invited Conference	2.0	12.5	(8)
Thesis Committee Meeting	11.6	55.6	(45)
Briefing	3.5	43.8	(16)
Other oral	0.2	100.0	(1)
Written Report	58.2	29.0	(224)
Technical Report	15.7	29.5	(61)
In-House Publication	9.1	38.9	(36)
Thesis or Dissertation	22.5	28.4	(88)
Proceedings or Symposium Presentation	1.2	40.0	(5)
Journal Article	3.2	30.8 (	(13)
Copy of Oral Presentation	5.0	20.0	(20)
Other Written	0.7	33.3	(3)

[a] Numbers in parentheses refer to the "N" on which the percentage is based, i.e., the number of authors making a specific type of report.

Slide 4

Cross-Citations of Articles in Journals on Educational Research

Cited Journal	Citing Journal: American Educational Research Journal (N=58)	Educational & Psychological Measurement (N=101)	Journal of Educational Psychology (N=141)	Journal of Educational Research (N=89)	Total (N=384)
American Educational Research Journal	22%	3%	14%	10%	12%
Educational and Psychological Measurement	29	79	5	6	28
Journal of Educational Psychology	41	15	75	46	48
Journal of Educational Research	7	3	6	38	13

Slide 5

Median Time Between Publication of Articles in Educational Research Journals and Their Citations in Educational Research Journals

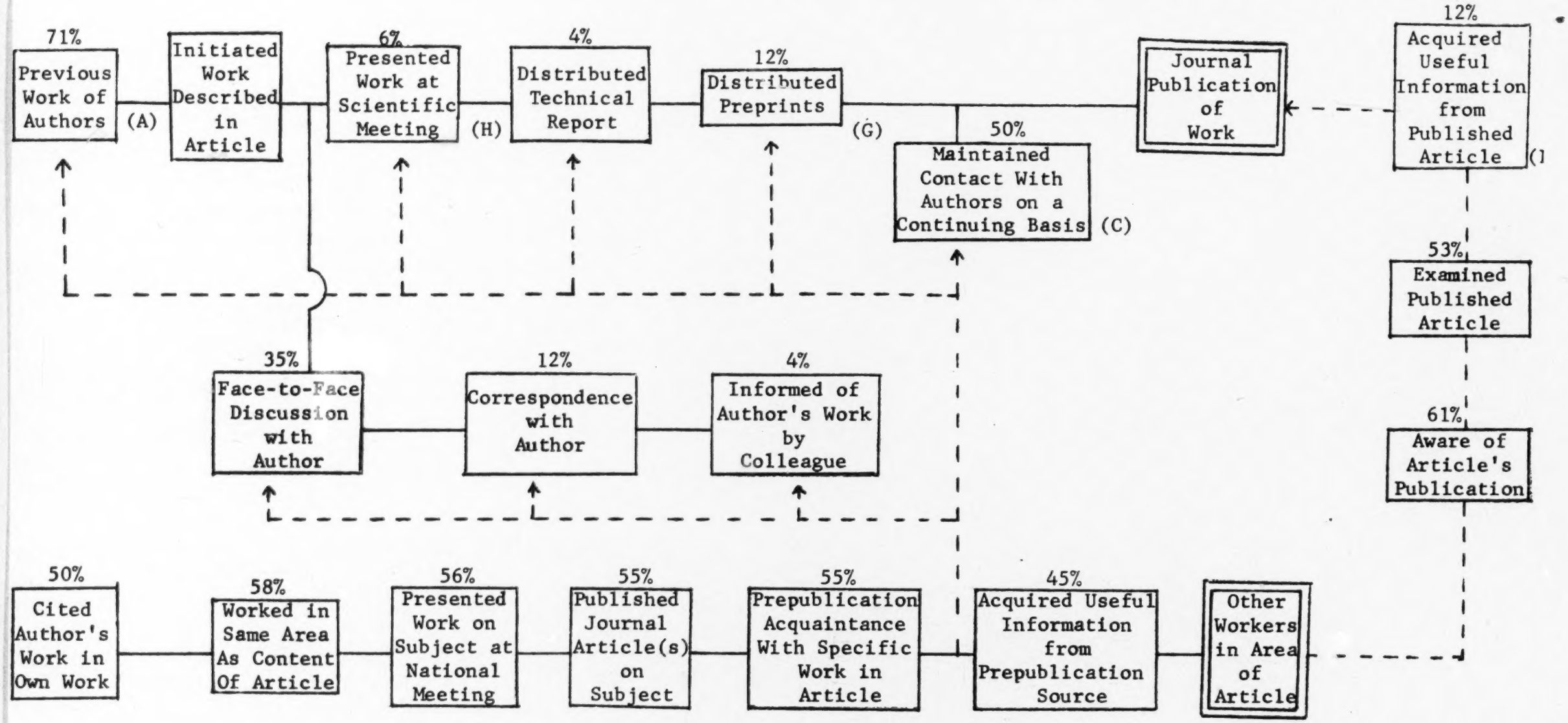
	Journal of Citing Article				
Journal of Cited Article	American Educational Research Journal	Educational & Psychological Measurement	Journal of Educational Psychology	Journal of Educational Research	Total
American Educational Research Journal	24 mos.	39 mos.	35 mos.	46 mos.	32 mos.
Educational and Psychological Measurement	89	63	97	90	65
Journal of Educational Psychology	53	120	45	95	76
Journal of Educational Research	49	120	89	56	60
Total	44	77	57	80	61

Slide 6

Characteristics of Respondents

	Percentages	
	Authors (N=385)	Other Workers (N=159)
Highest Degree		
Doctorate	88.6%	94.9%
Median Date	(1964)	(1958)
Specialized in Psychology	43.6	44.6
Specialized in Educational Psychology	21.8	22.6
Specialized in Education	27.0	25.1
Primary Professional Activity		
Teaching	40.8	27.0
Basic Research	15.3	27.0
Applied Research	11.7	13.8
Administration	14.8	15.0
Research Guidance	2.1	6.2
Consulting	2.1	1.2
Design and Development	2.9	3.1
Test and Support	2.3	0.6
Professional Activities (any type involvement)		
Teaching	81.8	85.0
Basic Research	62.1	68.6
Applied Research	73.5	66.7
Administration	50.9	69.5
Research Guidance	71.4	82.4
Consulting	62.6	64.8
Design and Development	37.9	42.2
Test and Support	31.4	19.5

Slide 7



Slide 8: Schematic Diagram of Pre- and Postpublication Assimilation of Information Published in Journal Articles